What is claimed is:

1. A data-aided method of tracking the timing offset between a transmitted signal having a training sequence and a received signal using a pre-estimated timing offset, the method comprising the steps of:

    a. obtaining a corrected received signal using the received signal and the pre-estimated timing offset;

    b. obtaining a first estimate of the deviation in the pre-estimated timing offset out of a plurality of probable deviations by performing the steps of:

        i. obtaining an expected signal corresponding to the first probable deviation using the training sequence;

        ii. calculating an error factor between the expected signal and the corrected received signal shifted through the first probable deviation;

    performing the steps i and ii for each probable deviation; and

        iii. identifying the probable deviation yielding the optimum value of error factor as the first estimate of the deviation; and

    c. obtaining an improved estimate of the deviation using the corrected received signal and the first estimate of the deviation.

2. The method as recited in claim 1 wherein the step of obtaining an expected signal corresponding to a probable deviation comprises the steps of:

    a. estimating a channel transfer function corresponding to the probable deviation; and

    b. filtering the training sequence through the channel transfer function to obtain an expected signal corresponding to the probable deviation.

3. The method as recited in claim 2 wherein the step of estimating the channel transfer function corresponding to the probable deviation comprises de-convolving the corrected received signal shifted through the probable deviation with the training sequence.

4. The method as recited in claim 1 wherein the step of calculating the error factor is performed by calculating the square error between the expected signal corresponding to the probable deviation and corrected received signal shifted through the probable deviation.

5. The method as recited in claim 1 where in the step of obtaining the improved estimate of the deviation comprises the steps of:

   a. calculating the correlation between the training sequence and the corrected received signal shifted through a plurality of closely-spaced probable deviations, the plurality of closely-spaced probable deviations selected in the proximity of the first estimate of the deviation; and

   b. identifying the closely-spaced probable deviation yielding the maximum correlation peak as the improved estimate of the deviation.

6. A data-aided method of tracking the timing offset between a transmitted signal having a training sequence and a received signal using a pre-estimated timing offset, the method comprising the steps of:

   a. obtaining a corrected received signal using the received signal and the pre-estimated timing offset;

   b. obtaining a first estimate of the deviation in the pre-estimated timing offset out of a plurality of probable deviations by performing the steps of:

i. de-convolving the corrected received signal shifted through the first probable deviation with the training sequence to obtain an estimated channel transfer function;

ii. filtering the training sequence through the estimated transfer function to obtain an expected signal corresponding to the first probable deviation;

iii. calculating an error factor between the expected signal and the corrected received signal shifted through the first probable deviation;

performing steps i - iii for each probable deviation; and

iv. identifying the probable deviation yielding the optimum value of error factor as the first estimate of the deviation; and

c. obtaining an improved estimate of the deviation using the corrected received signal and the first estimate of the deviation.

7. The method as recited in claim 6 wherein the step of obtaining an improved estimate of the deviation comprises the steps of:

a. calculating the correlation between the training sequence and the corrected received signal shifted through a plurality of closely-spaced probable deviations, the plurality of probable deviations selected in proximity to the first estimate of the deviation; and

b. identifying the closely-spaced probable deviation yielding the maximum correlation peak as the improved estimate of the deviation.

8. The method as recited in claim 1 wherein at least one of the steps is embodied in a computer program product.

9. The method as recited in claim 6 wherein at least one of the steps is embodied in a computer program product.

10. A system for data-aided tracking of the timing offset between a transmitted signal having a training sequence and a received signal using a pre-estimated timing offset, the system comprising:

    a. a pre-corrector obtaining a corrected received signal using the received signal and the pre-estimated timing offset;

    b. a coarse estimator obtaining a first estimate of the deviation in the pre-estimated timing offset out of a plurality of probable deviations, the coarse estimator comprising:

        i. an expected signal calculator obtaining an expected signal corresponding to a probable deviation using the training sequence;

        ii. an error calculator calculating an error factor between an expected signal corresponding to a probable deviation and the corrected received signal shifted through the probable deviation; and

        iii. a deviation selector identifying the probable deviation yielding the optimum value of error factor as the first estimate of the deviation; and

    c. a refiner obtaining an improved estimate of the deviation using the corrected received signal and the first estimate of the deviation.

11. The system as recited in claim 10 wherein the expected signal calculator comprises:

a. a channel estimator estimating a channel transfer function corresponding to a probable deviation; and

b. a channel filter filtering the training sequence through the estimated channel transfer function to obtain an expected signal corresponding to the probable deviation.

12. The system as recited in claim 11 wherein the channel estimator comprises a de-convolving block de-convolving the corrected received signal shifted through a probable deviation with the training sequence to obtain an estimated channel transfer function corresponding to the probable deviation.

13. The system as recited in claim 10 wherein the error calculator comprises a square error calculating block calculating the square error between the expected signal corresponding to a probable deviation and the corrected received signal shifted through the probable deviation.

14. The system as recited in claim 10 wherein the refiner comprises:

a. a correlator calculating correlation between the training sequence and the corrected received signal shifted through a plurality of closely-spaced probable deviations in the proximity of the first estimate of the deviation; and

b. a maximum correlation identifier identifying the closely-spaced deviation yielding the maximum correlation peak as the improved estimate of the deviation.

15. A system for data-aided tracking of the timing offset between a transmitted signal having a training sequence and a received signal using a pre-estimated timing offset, the system comprising:

a. a pre-corrector obtaining a corrected received signal using the received signal and the pre-estimated timing offset;

b. a coarse estimator obtaining a first estimate of the deviation in the pre-estimated timing offset out of a plurality of probable deviations, the coarse estimator comprising:

i. de-convolving block de-convolving the corrected received signal shifted through a probable deviation with the training sequence to obtain an estimated channel transfer function corresponding to the probable deviation;

ii. a channel filter filtering the training sequence through the estimated channel transfer function to obtain an expected signal corresponding to the probable deviation;

iii. an error calculator calculating an error factor between the expected signal corresponding to a probable deviation and the corrected received signal shifted through the probable deviation; and

iv. a deviation selector identifying the probable deviation yielding the optimum value of error factor as the first estimate of the deviation; and

c. a refiner obtaining an improved estimate of the deviation using the corrected received signal and the first estimate of the deviation.

16. The system as recited in claim 15 wherein the refiner comprises:

a. a correlator calculating correlation between the training sequence and the corrected received signal shifted through a plurality of closely-spaced probable deviations in the proximity of the first estimate of the deviation; and

b. a maximum correlation identifier identifying the closely-spaced deviation yielding the maximum correlation peak as the improved estimate of the deviation.

17. A system for data-aided tracking of the timing offset between a transmitted signal having a training sequence and a received signal using a pre-estimated timing offset, the system comprising:

a. a pre-corrector obtaining a corrected received signal using the received signal and the pre-estimated timing offset;

b. a coarse estimator obtaining a first estimate of the deviation in the pre-estimated timing offset out of a plurality of probable deviations, the coarse estimator comprising:

i. a plurality of expected signal calculators, each expected signal calculator obtaining an expected signal corresponding to a probable deviation using the training sequence;

ii. a plurality of error calculators, each error calculator corresponding to an expected signal calculator and calculating an error factor between the expected signal and the corrected received signal shifted through the probable deviation; and

iii. a deviation selector identifying the probable deviation yielding the optimum value of error factor as the first estimate of the deviation; and

c. a refiner obtaining an improved estimate of the deviation using the corrected received signal and the first estimate of the deviation.

18. The system as recited in claim 17 wherein the refiner comprises:

a. a correlator calculating correlation between the training sequence and the corrected received signal shifted through a plurality of closely-spaced probable deviations in the proximity of the first estimate of the deviation; and

b. a maximum correlation identifier identifying the closely-spaced deviation yielding the maximum correlation peak as the improved estimate of the deviation.